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Stigma and the Take-up of Social Programs

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Abstract

Empirical studies send mixed messages as to the magnitude of social stigma associated with the take-up of social transfers and the impact of stigma on take-up. These mixed signals may be related to the fact that stigma and program participation are likely to be jointly determined. If there is a high (low) degree of participation in a program, stigma is likely to be lower (higher) due at least in part to that high (low) degree of participation. This is because the more eligible persons participate, the less one can single out specific individuals for stigma because they use the program. This note suggests this theoretically with a simple model showing that we may have in an idealized setting two equilibria: one with stigma and zero participation in a social program, and one with perfect participation and no stigma.

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Stigma and the Take-up of Social Programs[†]

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I. Introduction

Substantial work has been done on the take-up of social programs and on the role of stigma in reducing take-up (for early work in this area see Moffitt, 1981, 1983; for literature reviews, see Andrade, 2002, and Currie, 2004). The evidence from recent empirical studies is mixed as to whether stigma is pervasive and has an impact on take-up.

On one side of the debate, Hernandez et al. (2007) show that take-up of income support is lower than take-up of housing benefits and council tax benefits among pensioners in the United Kingdom in part due to greater stigma associated with income support. Levinson and Rahardja (2005) use data from the National Survey of America's Families in the United States which includes questions on stigma to show that families that do not enroll in Medicaid tend to have more negative perceptions of welfare, suggesting that stigma reduces take-up. Riphahn (2001) shows that in Germany more than half of all eligible households do not claim social assistance transfers in part due to stigma. Henderson et al. (2006) show that stigma associated with substance abuse makes it difficult in the United States to identify individuals who could benefit from substance abuse services. Again in the United States, Stuber and Kronebush (2004) use data from community health center patients to show that stigma reduces take-up of welfare and Medicaid benefits.

On the other side of the debate, there are also several studies that suggest that stigma may not be as pervasive as commonly believed, or may not have a larger impact on take-up. For example, using data on the use of food stamps in San Diego County, Breunig and Dasgupta (2003) do not find evidence supporting the assumption of a welfare stigma associated with the use of food stamps. Similarly, Bingley and Walker (2001) suggest that in the United Kingdom, stigma associated with housing benefits is low.

The fact that empirical studies send mixed messages as to the magnitude of stigma and its impact on take-up may be due to differences in stigma between programs. Such differences may in turn be related to the fact that stigma and take-up are likely to be jointly determined. If there is a high (low) degree of participation in a program, stigma is likely to be lower (higher) since the more eligible persons participate, the less one can single out and stigmatize specific individuals because they use the program. The objective of this note is to show this theoretically with a simple game-theoretic model. Our strategy for constructing our model consists in relying on the properties of supermodular games. It is well known that games with strategic complementarities may have multiple equilibria and thereby coordination failures (Diamond, 1982; Cooper and John, 1988). With supermodular games, there is no need to rely on mixed-strategies for demonstrating the existence of a Nash equilibrium, since existence of equilibrium in such games does not require continuity of best response functions (i.e., application of Tarski's fixed point theorem). An implication of supermodularity is that we can restrict the search for equilibria to pure-strategy Nash-equilibria since mixed-strategies equilibria when they exist are unstable (Echenique and Edlin, 2004). Our morel turns out to have two stable equilibria, one with stigma and a zero take-up rate for social programs, and one with a perfect participation rate and no stigma at all. The fact that we can have such different outcomes may help explain why in empirical work, stigma and take-up depend a lot on specific circumstances.

II. The Environment

Consider a community populated by $N > 0$, ex ante individuals. Community members are equally endowed in the initial situation with a income level $\overline{y} > 0$, necessary to finance their lifestyle. Assume this community experiences idiosyncratic shocks that are sufficiently severe and randomly distributed among its members.[1] Let $\varepsilon \in \{0, 1\}$ denote the discrete states space, where $\varepsilon = 1$ and $\varepsilon = 0$ represent respectively states of nature with and without idiosyncratic shocks.

When affected by a shock , a typical community member $i \in I$ (where $I = \{1, ...N\}$) becomes a poor agent; otherwise, she is not. It is assumed that each poor agent is automatically eligible for a social transfer equivalent to the loss due to the shock when it is requested. Let $\underline{y}$ with $0 < \underline{y} < \overline{y}$ denote the income level of a poor agent if she does not

[1] The reader can think of idiosyncratic shocks such as illness, physical disability, death of a family member, job loss, etc.

request social transfers. The take-up decision is denoted by $s_i \in \{0, 1\}$, where $s_i = 1$ and $s_i = 0$ respectively mean that the community member i takes the social transfer or not. For simplicity, it is assumed that $s_i = 1$ entails no information or economic cost for the agent. Let π_i denote the residual claims by a typical individual $i \in I$ living in this community. We have that:

$$\pi_i = \begin{cases} \overline{y} & \textit{if } \varepsilon_i = 0 \textit{ or } (\varepsilon_i = 1 \textit{ and } s_i = 1) \\ \underline{y} & \textit{if } \varepsilon_i = 1 \textit{ and } s_i = 0 \end{cases} \tag{II.1}$$

While there is no economic cost of requesting the transfer, there is a social cost in the form of stigma. We denote as $\theta_i = \theta(s_i/\varepsilon_i)$ the social prestige of individual i in his community, conditional upon the idiosyncratic shock. We make the following assumptions:

Assumption 1. *For all s_i, $\theta(s_i/0) = \overline{\theta}$; and given $\varepsilon_i = 1$,*

$$\theta(s_i/1) = \begin{cases} \overline{\theta} & \textit{if } s_i = 0 \\ \alpha(n) \in \{\underline{\theta}, \overline{\theta}\} & \textit{if } s_i = 1 \end{cases} \tag{II.2}$$

Where $0 < \underline{\theta} < \overline{\theta}$ and

$$n = \frac{\sum\limits_{i \in I} s_i}{\sum\limits_{i \in I} \varepsilon_i} \tag{II.3}$$

Assumption 1 states that social prestige associated with $s_i = 0$ is higher than when an agent requests the transfer ($s_i = 1$), although the loss in prestige associated with take-up depends on the participation rate in the program among the eligible population.

Assumption 2. *The function α is defined as:*

$$\alpha(n) = \begin{cases} \overline{\theta} & \text{if } n \geq n^* \\ \underline{\theta} & \text{if } n < n^* \end{cases} \tag{II.4}$$

where $n^* \in (1/\sum_i \varepsilon_i, 1)$ denotes the critical take-up rate above which take-up does not reduce social prestige.

As n^* is bounded below by $1/\sum_i \varepsilon_i$, the loss in social prestige is highest for an individual if that individual is the only one requesting the transfer (then $\theta(s_i/1) = \underline{\theta}$ for that individual). When $n \geq n^*$ there is no more stigma for any of the individuals who requested the transfer. Next, we assume that all agents derive utility from the net endowment $\pi_i \in \{\underline{y}, \overline{y}\}$ and from the social prestige $\theta_i \in \{\underline{\theta}, \overline{\theta}\}$ through a valued utility function $\psi(\pi_i, \theta_i)$ with specific properties.

Assumption 3. *The function $\psi : \{\underline{y}, \overline{y}\} \times \{\underline{\theta}, \overline{\theta}\} \rightarrow \Re$ is strictly increasing in each of its arguments:*

$$\begin{array}{lllll} (i) & \text{for all } \pi' & > & \pi, & \psi(\pi', \theta) - \psi(\pi, \theta) > 0, \quad \text{for each } \theta \text{ fixed} \\ (ii) & \text{for all } \theta' & > & \theta, & \psi(\pi, \theta') - \psi(\pi, \theta) \geq 0, \quad \text{for each } \pi \text{ fixed.} \end{array}$$

This assumption of non-satiation implies that given his social prestige, any agent is always better off having a high-level of initial income than a lower one (property i) , and conversely given his level of initial endowment, any agent in this environment is always better off having a higher social prestige than a lower one (property ii).

Assumption 4. *The function $\psi : \{\underline{y}, \overline{y}\} \times \{\underline{\theta}, \overline{\theta}\} \rightarrow \Re$ has strictly increasing differences in (π, θ): for all $\pi' > \pi$ and $\theta' > \theta$,*

$$\begin{aligned} \psi(\pi', \theta') - \psi(\pi, \theta') &> \psi(\pi', \theta) - \psi(\pi, \theta). \\ \psi(\pi', \theta') - \psi(\pi', \theta) &> \psi(\pi, \theta') - \psi(\pi, \theta). \end{aligned}$$

This assumption implies that the incremental gain from a higher level of income is greater when the agent also has a higher level of social prestige and vice versa. In a community setting where social prestige matters, this seems to be a reasonable assumption.

Assumption 5. *The parameters* $\underline{y}, \overline{y}, \underline{\theta}$ *and* $\overline{\theta}$ *satisfy the following condition:*

$$\psi\left(\underline{y}, \overline{\theta}\right) - \psi\left(\overline{y}, \underline{\theta}\right) \geq 0. \tag{II.5}$$

Assumption 5 states that the loss of social prestige is more costly to the household than the loss of income.

A. The Take-up Game

We now turn to the analysis of the interactions between agents using standard tools from game theory. Each agent affected by a idiosyncratic shock is indexed by k, with $k \in K$ (where $K = \{1, ...M\}$) and $M = \sum_i \varepsilon_i$. Denote as $S_k = \{0, 1\}$ the set of actions that can be taken by player $k \in K$, with generic element $s_k \in S_k$. Let $S = \times_{k \in K} S_k$ represent the players strategy space. We also define $S_{-k} = \times_{\{j \in K; j \neq k\}} S_j$ as the set of feasible joint strategies for all affected agents other than k, with generic element $s_{-k} \in S_{-k}$. A strategy profile is denoted by $s = (s_k, s_{-k}) \in S$. The payoff function of player k who experiences a income-diminishing shock but elects not to apply for benefits ($s_k = 0$) is $\psi\left(\underline{y}, \overline{\theta}\right)$. In contrast, the payoff function for an agent affected by a shock who chooses to apply for benefits ($s_k = 1$) is $\Gamma(n)$, with

$$\Gamma(n) = \begin{cases} \psi\left(\overline{y}, \overline{\theta}\right) & \text{if } n \geq n^* \\ \psi\left(\overline{y}, \underline{\theta}\right) & \text{if } n < n^* \end{cases} \tag{II.6}$$

In generic terms, the payoff function $g_k : S \rightarrow \Re$ of a player can be defined as follows:

$$g_k\left(s_k, s_{-k}\right) = s_k \Gamma(n) + (1 - s_k) \psi\left(\underline{y}, \overline{\theta}\right). \tag{II.7}$$

A *non-cooperative normal-form game* is the triple $\Omega = \langle K, S, \{g_k : k \in K\}\rangle$ consisting of a non-empty set of players K, a set S of players joint decision strategies, and a collection of payoff functions $\{g_k : k \in K\}$. Given that all affected agents have the same strategy set ($S_1 = S_2 = ...S_M$), and for all $k, j \in K$, $g_k(s) = g_j(p)$ for all $k \neq j$, the normal game Ω is symmetric.[2]

B. Pure Nash Equilibria

We can define a Nash equilibria when all affected agents make their take-up decision simultaneously.

Definition 1. *A pure-strategy profile $s^* \in S$ is a Nash equilibrium of Ω if and only if $g_k(s^*) \geq g_k(s_k, s^*_{-k})$ for all $s_k \in S_k$ and all $k \in K$.*

Denote as $\aleph_\Omega$ the set of Nash equilibria of the game. Let s^1 and s^0 be feasible strategy profiles, where s^1 (respectively s^0) is the strategy profile such that each affected agent $k \in K$ chooses to apply for benefits $s_k = 1$ (respectively not to apply for benefits $s_k = 0$). We can derive the following result which is proved in Appendix A.

Proposition 1. *Under Assumptions 1-5, $\{s^1, s^0\} \in \aleph_\Omega$.*

Proposition 1 states that the strategy profile where all affected agents decide to apply for benefits (i.e., s^1) and the one where none of them apply (i.e., s^0) belong to the set of pure Nash equilibria of the symmetric game Ω.

Before we proceed to derive further policy implications from the result outlined in Proposition 1, we must address the question of whether the strategy profiles s^0 and s^1 are indeed the only stable equilibria of the symmetric game, Ω. After all, there is no a priory guarantee that a symmetric game with strategic complementarities only has symmetric equilibria. Therefore to address this issue of whether $\{s^0, s^1\}$ are indeed the only equilibria of the take-up game, we first show that Ω is indeed a supermodular game (as this concept

[2]Hence, the identity of the players does not matter and we do not need to consider strategy profile separately.

is defined and used in Milgrom and Roberts, 1990), also known as a game characterized by strategic complementarities.

Definition 2. *(Milgrom and Roberts [1990]) Ω is a supermodular game, if for all k,*

(i) S_k *is a compact subset of* $\Re$;

(ii) g_k *is upper semi-continuous in* s_k*, for each fixed* s_{-k}

(iii) g_k *is continuous in* s_{-k} *for each fixed* s_k;

(iv) g_k *has a finite upper bound*;

(v) g_k *has increasing differences in* (s_k, s_{-k}) *on* $S_k \times S_{-k}$.

In particular, property *(v)* of Definition 2 implies that for a player k, the incremental gain from applying for benefits is higher when the others players also apply for benefits: for all $s'_k > s_k$ and all $s'_{-k} > s_{-k}$,

$$g_k\left(s'_k, s'_{-k}\right) - g_k\left(s_k, s'_{-k}\right) \geq g_k\left(s'_k, s_{-k}\right) - g_k\left(s_k, s_{-k}\right).$$

To show that the take-up game Ω is supermodular, it suffices to prove that properties (i)-(v) of Definition 2 are satisfied. The following Proposition, which is proved in Appendix B, establishes this result.

Proposition 2. *Under Assumptions 1-5, the symmetric game Ω, is supermodular.*

Proposition 2 in turn implies that conditions underlying Topki's theorem apply so that any best response $\beta_k(s_{-k})$ for agent k is increasing in the other agents' actions. That is, for all $s'_{-k} > s_{-k}$, we have $\beta_k(s'_{-k}) \geq \beta_k(s_{-k})$, where:

$$\beta_k(s_{-k}) \in \arg\max_{s_k \in S_k} \; g_k\left(s_k, s_{-k}\right).$$

The next proposition derives from the fact that $\beta_k(s_{-k})$ are increasing. Now, since $\beta_k(s_{-k})$ are increasing, to rule out asymmetric pure-strategy Nash equilibria, we show in the following Lemma—which we prove in Appendix C—, that community members' best reply are single-valued correspondences (i.e., each β_k is a function):

Lemma 1. *Let* $\beta_k(s_{-k}) = \left\{s_k : s_k \in \arg\max_{s_k \in S_k} g_k(s_k, s_{-k})\right\}$, *for all* k, *given* s_{-k}. *Then, under Assumptions 1-5,* $\beta_k(s_{-k})$ *is a singleton.*

Lemma 1 states that players best replies are single-valued. This result, combined with our above application of Topkis' theorem rules out the existence of asymmetric pure-strategy Nash-equilibria for the take-up game. Hence the following Proposition:

Proposition 3. *Under Assumptions 1-5,* $\{s^1, s^0\} = \aleph_\Omega$.

Proposition 3 states that the strategy profiles when either all or none of the agents apply for benefits are the only pure Nash equilibria. This multiplicity of equilibria suggests a potential role for a deliberate action to select one of the equilibria. Such deliberate action is desirable, however, only if the two equilibria can be ranked according to the Pareto principle. The following Proposition establishes this ranking.

Proposition 4. *Under Assumptions 1-5, the symmetric pure-strategy* s^1 *Pareto dominates the profile* s^0.

Proof: To prove this Proposition, it suffices to show that for all $k \in K$, and for all $s_k \in S_k$, $g_k(s^1) - g_k(s^0) > 0$. Let $\Delta_k = g_k(s^1) - g_k(s^0)$. From the definition of the payoff function , the difference Δ_k reduces to:

$$\Delta_k = \psi\left(\overline{y}, \overline{\theta}\right) - \psi(\underline{y}, \overline{\theta}).$$

The result follows from Assumption 3 on the increasing property of the utility function ψ.

Thus, proposition 4 states that the strategy profile where all affected agents elect to apply for benefits is strictly preferred to the one where none of them do.

III. Conclusion

We have provided a simple game-theoretic model to show that in an idealized setting, we may observe two equilibria in terms of the take-up of social programs by the poor and the stigma associated to this take-up. If all eligible individuals apply for benefit, there is no stigma. If none of the individuals apply, the stigma that would be associated with take-up would be high, and indeed too high for individuals to apply. Real life is obviously much more complex than our simple model, but the model clearly shows that stigma and take-up rates are endogenously determined. furthermore, from a policy point of view, it is better to encourage high take-up rates and thereby eliminate stigma to improve welfare.

IV. Appendix

A. Proof of Proposition 1:

The proof can be divided in two claims:

Claim 1. *The strategy profile* $s^1 = (s_1^1, ..., s_k^1, ..., s_M^1)$ *such that* $s_k = 1$ *for all* $k \in K$*, is a pure-strategy Nash equilibrium of* Ω*.*

Proof: Using (II.7) and Definition 1 of a Nash equilibrium, it follows that the strategy profile s^1 is a pure-strategy Nash equilibrium if the following condition is satisfied, :

$$\psi\left(\overline{y}, \overline{\theta}\right) - \psi(\underline{y}, \overline{\theta}) \geq 0.$$

Since $n^* \in (1/\sum_i \varepsilon_i, 1)$, the result then clearly follows from the increasing property of ψ .Hence the result.

Claim 2. *The strategy profile* $s^0 = (s_1^0, ..., s_k^0, ..., s_M^0)$ *such that* $s_k = 0$ *for all* $k \in K$*, is a pure-strategy Nash equilibrium of* Ω*.*

Proof: With condition (II.5) in hands, the proof follows in the same manner as in claim 1. This complete the proof of Proposition 1.

B. Proof of Proposition 2:

To prove proposition 2, first, observe that for all k, $S_k = \{0, 1\}$, is clearly a compact subset of $\Re$, since s_k is closed and bounded. Therefore property (i) of a supermodular game is trivially satisfied. Second, to establish property (ii) and (iii), it suffices to prove the following claim:

Claim 1. *For all* $k \in K$*, the function* $g_k : S \to \Re$*, is continuous on* S*, where* $S = \times_{k \in K} s_k$*.*

Proof. Since s_k is finite for all i, therefore S is also finite, as the Cartesian product of a finite number of finite sets. Indeed, S has cardinal equal to 2^N, which is finite, since M is a finite number. Therefore, by theorem[3], g_k is continuous on S. This establishes property (ii) and (iii) of a supermodular game.

Third, to establish property (iv), it suffices to prove the following claim:

Claim 2. *For all $k \in K$, the function $g_k : S \rightarrow \Re$, attains a maximum on S.*

Proof. Since the set of feasible joint strategies reduced to S is finite and has no more than 2^N elements, we also have that $g_k(S) \subset \Re$ is also finite; and finite subsets of $\Re$ always contain their upper and lower bounds. It therefore follows that, g_k has a finite upper bound on S. This completes the proof of this claim.

Fourth, the following claim establishes property (v).

Claim 3. *Under Assumptions 1-5, the function $g_k : S \rightarrow \Re$ has increasing differences in (s_k, s_{-k}) on $S_k \times S_{-k}$: for all $k \in K$, for all $s'_k > s_k$ and $s'_{-k} > s_{-k}$,*

$$g_k\left(s'_k, s'_{-k}\right) - g_k\left(s_k, s'_{-k}\right) \geq g_k\left(s'_k, s_{-k}\right) - g_k\left(s_k, s_{-k}\right) \tag{IV.1}$$

Proof: Let $s'_k > s_k$ *and* $s'_{-k} > s_{-k}$ and suppose,

$$g_k\left(s'_k, s'_{-k}\right) - g_k\left(s_k, s'_{-k}\right) < g_k\left(s'_k, s_{-k}\right) - g_k\left(s_k, s_{-k}\right). \tag{IV.2}$$

Since $s_k \in \{0, 1\}$, take $s'_k = 1$ and $s_k = 0$. Then, using definition of $g_k(.)$, it can be shown that the strict inequality (IV.2) reduces to:

$$\Gamma\left(n'_{-k}\right) - \Gamma\left(n_{-k}\right) < 0 \tag{IV.3}$$

where

$$n'_{-k} = 1 + \sum_{j \neq k} s'_j$$

$$n_{-k} = 1 + \sum_{j \neq k} s_j$$

[3]**Theorem** (continuity with opened sets): Any function defined on a finite set is continuous.

Since $s'_{-k} > s_{-k}$, its follows that $n'_{-k} > n_{-k}$ by construction. Now, if $n'_{-k} \leq n^*$ or $n^* \leq n_{-k}$, condition (II.6) leads to $\Gamma\left(n'_{-k}\right) - \Gamma\left(n_{-k}\right) = 0$ and we reach a contradiction. Next, if $n_{-k} \leq n^* \leq n'_{-k}$ instead, then (IV.3) reduces to

$$\psi\left(\overline{y}, \overline{\theta}\right) - \psi\left(\overline{y}, \underline{\theta}\right) < 0. \tag{IV.4}$$

Due to the strict increasing property of the utility function ψ, inequality (IV.4) never hold. Once more, we reach a contradiction. Hence the result. This complete the proof of Proposition 2.

C. Proof of Lemma 1.

To prove Lemma 1, it suffices to show that given $s_{-k} \in S_{-k}$, and for all pairs $\left(s_k^L, s_k^H\right) \in S_k \times S_k$ such that $s_k^L \neq s_k^H$, $g_k\left(s_k^L, s_{-k}\right) \neq g_k\left(s_k^H, s_{-k}\right)$. Suppose by way of contradiction that for some $k \in K$ and for some $\widehat{s}_{-k} \in S_{-k}$, we have

$$g_k\left(s_k^L, \widehat{s}_{-k}\right) = g_k\left(s_k^H, \widehat{s}_{-k}\right). \tag{IV.5}$$

Since $S_k = \{0, 1\}$, take $s_k^L = 0$ and $s_k^H = 1$. Then, we can rewrite (IV.5) as follows:

$$g_k\left(0, \widehat{s}_{-k}\right) = g_k\left(1, \widehat{s}_{-k}\right),$$

which, using the definition of function g_k, reduces to

$$\psi\left(\underline{y}, \overline{\theta}\right) = \Gamma\left(\widehat{n}\right), \tag{IV.6}$$

where

$$\widehat{n} = 1 + \sum_{j \neq k} \widehat{s}_k$$

Now, if $\widehat{n} < n^*$, then equality (IV.6) reduces to

$$\psi\left(\underline{y}, \overline{\theta}\right) = \psi\left(\overline{y}, \underline{\theta}\right),$$

which is a contradiction since by Assumption 5 $\psi\left(\underline{y},\overline{\theta}\right) \geq \psi\left(\overline{y},\underline{\theta}\right)$. If $\widehat{n} \geq \widetilde{n}\left(1\right)$, then (IV.6) reduces to

$$\psi\left(\underline{y},\overline{\theta}\right) = \psi\left(\overline{y},\overline{\theta}\right),$$

which contradicts the strictly increasing property ψ, i.e., $\psi\left(\overline{y},\overline{\theta}\right) - \psi\left(\underline{y},\overline{\theta}\right) > 0$. Hence the result.

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